REMARKS

Applicants appreciate the Examiner's thorough review of the present application, and respectfully request reconsideration in light of the preceding amendments and the following remarks.

Claims 2-21 are pending in the application. The claims are unchanged notwithstanding the Examiner's new grounds of rejection.

Applicants respectfully submit that claims 2-21 are not obvious over the applied references, namely, *Orita*, *Nakamura*, *Toshiba* and *Lee*.

With regard to *Toshiba*, Applicants note that the Examiner repeats again the previous allegation in the final office action of August 23, 2005, i.e., *Toshiba* teaches the claimed additional heat treatment recited in step (c') of independent claim 8 and step (d) of independent claim 11, which seems to contradict the Examiner's position indicated in the Advisory Action of December 8, 2005, i.e., *Orita* teaches the claimed additional treatment recited in step (d) of independent claim 11 and clarified in claim 21. Applicants further note that during the prosecution of this application, the Examiner has changed her position as to which reference teaches the claimed additional heat treatment (e.g., steps (c') of independent claim 8) several times. For example, in the first Office Action, the Examiner alleged that *Nakamura* teaches the claimed step and admitted that *Orita* does not teach the claimed step. In the final office action, she changed from *Nakamura* to *Toshiba* as a reference teaching the claimed step. In the Advisory Action, she changed from *Toshiba* to *Orita* as a reference teaching the claimed step. Now, she again relied on *Toshiba* for the claimed step.

The Examiner is kindly asked to set forth a consistent position, so that the rejection(s) can be properly understood and responded to.

The *35 U.S.C. 103(a)* rejections of claims 2-21 are traversed for the following reasons.

First, *Toshiba* fails to teach or suggest the claimed additional heat treatment process (step (c') of independent claim 8 or step (d) in independent claim 11).

It should be noted that the additional heat treatment of the claimed invention is performed on the un-doped nitride semiconductor crystal film before forming the first conductive semiconductor layer. However, *Toshiba*'s annealing process is performed on a different layer, i.e., the p-doped GaN layer, at a different time, i.e., after forming the p-doped GaN layer. *See Toshiba* at Abstract and paragraph [0021].

Furthermore, the additional heat treatment of the invention is performed to improve the surface condition of the un-doped nitride semiconductor crystal film after performing a surface treatment process, i.e., steps (c) of independent claims 8 and 11). *See* page 13, lines 14-24 and page 15, lines 1-10 of the specification. However, *Toshiba*'s annealing process is performed for another purpose, i.e., to prevent deterioration of the n-type GaN layer. *See Toshiba* at Abstract and paragraph [0026].

Finally, the additional heat treatment of the invention can be performed at a temperature (e.g. 1000-1500℃) substantially higher than the process temperature (200-400℃) of the *Toshiba* annealing process. The additional heat treatment of the invention can also be performed in a non-nitrogen atmosphere (e.g., Hydrogen gas). *See*, e.g., claims 8, 11 and 21, as well as page 13, lines 16-19 and page 14, lines 7-10 of the specification. To the contrary, the *Toshiba* annealing process must be performed in a nitrogen-containing gas in order to prevent N evaporation from GaN layers 13, 14.

Accordingly, Applicants respectfully submit that *Toshiba*'s annealing process is totally different from the additional heat treatment of the step (c') in independent claim 8 and step (d) in independent claim 11. The Examiner's combination of *Orita* and *Nakamura* with *Toshiba*, if proper, would fail to teach or disclose the claimed additional heat treatment.

Second, *Toshiba* is not combinable with *Orita* in the manner the Examiner has proposed.

Applicants attach herewith *Exhibit A* which summarizes the teachings of the references, the steps of the claimed invention, and the Examiner's suggested combination. As can be seen in FIG. *Exhibit A*, the step of forming layers 13, 14 in *Toshiba* corresponds to the step of forming layer 13 of *Orita*. A person of ordinary skill in the art would recognize that if *Toshiba* was combinable with *Orita*, which Applicants contend to the contrary, the *Toshiba* annealing step, which is performed after the formation of *Toshiba*'s GaN layers 13, 14, would necessarily be performed after the *Orita* corresponding step, i.e., the step of forming layer 13 on layer 12. *See* also the dotted arrows in *Exhibit A*. The person of ordinary skill in the art would not have performed the *Toshiba* annealing step before the *Orita* step of forming layer 13 on layer 12 as suggested by the Examiner, because *Toshiba* does not teach such.

Accordingly, Applicants respectfully submit that *Toshiba* is not combinable with *Orita* in the manner proposed by the Examiner.

Third, the Examiner's suggestion or motivation to combine *Toshiba* with *Orita* is inadequate. In particular, the Examiner alleged that it would have been obvious to combine *Toshiba* with *Orita* for two reasons, namely:

(1) for the benefit of increasing the dopant activity, and

(2) for the benefit of obtaining a smooth surface by replenishing the loss of nitrogen, which inherently happens in *Orita* during the high temperature treatment step for removing oxides.

With respect to reason (1), the layer to be annealed in the Examiner's combination is the *Orita* layer 12 which has been modified, assuming *arguendo* properly, with *Nakamura* to be a undoped layer. *See* the Office Action at page 3, the full paragraph. In such *Nakamura/Orita* undoped layer, there are no dopants. Accordingly, a person of ordinary skill in the art would understand that the *Toshiba* annealing process would not have brought the benefit of increasing the dopant activity, contrary to the Examiner's allegation.

With respect to reason (2), there is no loss of nitrogen inherent in *Orita* during the high temperature treatment step for removing oxides, because the *Orita* oxide removing step is specially performed in a nitrogen atmosphere for the purpose of preventing nitrogen from leaving the surface of layer 12. *See Orita* at column 5, lines 20-24. Accordingly, the person of ordinary skill in the art would understand that the *Toshiba* annealing process would not have brought the benefit of replenishing the loss of nitrogen, contrary to the Examiner's allegation.

Accordingly, the person of ordinary skill in the art would recognize that the combined process of *Orita* and *Nakamura* would not have benefited at all from the Examiner's proposed further combination with *Toshiba*, and therefore would not have combined *Toshiba* with *Orita* and *Nakamura*.

For any of the overwhelming reasons advanced above, Applicants respectfully submit that the *35 U.S.C. 103(a)* rejections of claims 2-21 are inappropriate and should be withdrawn.

All claims are now believed in condition for allowance. Early and favorable indication of allowance is courteously solicited.

The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,
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Date: July 10, 2006
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